Exhibit A

Aged System Rewrite

On-line Trade Processing

Technical Design Document

Release 1.0

Document Version 1.2

September 10, 1998

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Overview

Online Trading (Edge)

What it does

- Provides PW Edge customers the ability to enter, correct and view equity orders over the Internet.
- Allows Brokers to view and correct customer originated trades through existing systems (DORS & BOE).
- Delivers the cornerstone suite of business rules for future order and trade processing systems (ConsultWorks, New Allocation System).

Business Benefits

- Meets competitive requirements.

Phasing

- Pilot 1Q'99
- Full Rollout TBD

Project Plan

- Xxxxxxxx.mpp using Edge template to coordinate with that group.

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Driver Level Pictorial

Notes to Driver Level Pictorial

Revisions

8/20/98

Moved Log and Assign Reference # processes out of the main processing path.
Whether these will be physically separate programs or logically separate (code within Driver) TBD.
See pictorial on these processes later in this document.

Previous comments not implemented

Additional processing modules, for example, "Assign investor code" should be shown in processing path.
This follows a guideline recommending a flat long hierarchy.
Issue here is that an arbitrarily long process path is not best practice for CICS. A link is expensive. Modularization for the sake of modularization should be avoided. A processing path of 7 programs would be at the upper end of best practice.

An ASR Guideline is to make the task path "as short as possible". To accomplish this, the suggestion is to "add a store". Adding a store, in this case is recommended to be accomplished by writing to a queue, which will then write to multiple queues.
Best practice is to write the 3 queues as designed in Alla's picture. Writing a queue to write a queue is a great deal of overhead and should only be used in cases where extreme CICS performance is required.

A single commarea definition is required for each unique processing path.
In previous applications, a single commarea with re-definitions and ample filler to avoid re-sizing has been used. The ASR Guidelines differ from this solution.

A single commarea with re-definitions is the way to go. The routing logic using this single commarea should be done as efficiently as possible. Not a long series of Cobol "if" statements. An efficient table will allow update of the path as needed and handle routing as efficiently as possible.
Specifically for ECI, multiple entry points are not advised. This would translate into multiple programs and thus multiple PPT entries.

Previous comments still outstanding

Message Processing Path - CICS maintained Data Table.

Message Type	PROC1	PROC2	PROC3	PROC4	PROC5	PROC6	PROC7	PROC8	Proc9	Proc10
Order Validate	Validate Order	Assign Ref #	Log POD	Notify	Cleanup					
Cancel Validate	Obtain Order	Validate Cancel	Assign Ref #	Log POD	Notify	Cleanup				
Partial Cancel Validate	Obtain Order	Validate Cancel	Assign Ref #	Log POD	Notify	Cleanup				
Cancel/ Replace Validate	Obtain Order	Validate Cancel	Validate Order	Assign Ref #	Log POD	Notify	Notify	Cleanup		
Order Confirm/ Submit	Confirm Order	Update POD	Assign Wire Code + Seq #	Translate Into CTPS/ D030/ TDB Formats	MQ to CTPS Process	MQ to D030 Process	MQ to TDB Process	Notify	Cleanup	
Cancel Confirm/ Submit	Confirm Cancel	Update POD	Assign Wire Code + Seq #	Translate Into CTPS/ D030/ TDB Formats	MQ to CTPS Process	MQ to D030 Process	MQ to TDB Process	Notify	Cleanup	
Partial Cancel Confirm/ Submit	Obtain Order	Confirm Cancel	Update POD	Assign Wire Code + Seq #	Translate Into CTPS/ D030/ TDB Formats	MQ to CTPS Process	MQ to D030 Process	MQ to TDB Process	Notify	Cleanup
Cancel/ Replace Confirm/ Submit	Obtain Order	Confirm Cancel	Update POD	Assign Wire Code + Seq #	Translate Into CTPS/ D030/ TDB Formats	MQ to CTPS Process	MQ to D030 Process	MQ to TDB Process	Notify	Cleanup

Message Processing Path - Notes.

A CICS maintained Data table - defines Processing Path for all Trading Events, loaded at the PLT Time.

Revisions

Changed from in-core table

From Bill Restemeyer email 8/28/98:
... Recommend a "CICS maintained Data Table." This backs up the data (and any dynamic changes) on disk and is therefore available to batch jobs. The only I/Os are at initial open of the file and when changes occur. Reading the data table will provide basically the same response-time as reading an in-core table.
There is another advantage: the programmer uses standard CICS file access commands (like EXEC CICS READ) and treats the data table as if it were a dataset.

Corrected table to remove "Validate" from description.

Validate Order Process Pictorial (1 of 2)

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Validate Order Process Pictorial (2 of 2)

Validate Order Process Notes

This process is approved to be a driver, like Notify.
Method of linkage is a different commarea only used to communicate between the driver and its sub-programs.

Returns data from Reference Data read to verify rules in commarea. Returns this info to Edge user.
- If price > $5 a share, commarea then contains the price
- If account verified, commarea contains the short name
- If symbol verified, commarea contains the name
- Investor code

Revisions

Rules to ensure Validate does not grow out of its scope:
- Validate cannot store (except commarea or tsqueue) or route.
- Validate can Read only, not write.

Previous comments not implemented

TSQueues have been identified as a technique to store data between tasks. By extension, this technique is the recommended solution for the same purpose within tasks

Within a task commarea should be used. In TOR/AOR environments, the entire commarea gets shipped back and forth. In this single region area, commarea is more efficient. Within a task, TSQueue is much more overhead than the commarea. Additionally, the issue of making this queue unique has not been solved.

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Validate Cancel Process Pictorial

Validate Cancel Process Notes

Cancel process is approved to be a driver, like Notify.

Method of linkage is a different commarea only used to communicate between the driver and its sub-programs.

Links to shared module OLTP3100 - Generic Validation Module for Cancel/Replace Request

Common Routines for all types of Cancels:
- Check Order Exists, Check Open Share   Quantity
- Assign Error Code/MSG, Set Update POD flag 'YES'/'NO'
- Assign Error Code/MSG, Set Update POD flag 'YES'/ 'NO'

Will read D030 or TDB, whichever is ready 1ˢᵗ. Eventually TDB will be used when available.

Revisions

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Business Rules Parameters Pictorial

Business Rules Parameters Notes

Parameter Driven Business Rules - allows:
- Flexibility
- Customization by different Presentation Layer
- Provides override capability by Account, Branch, Division, etc.

Data Model Logical/Physical is in Erwin - contact Martha Sandlain.

All rules in this result set are "ANDed".
Does not handle complex rules - code will be used for this.
Only exception to these rules is the tbd "OVERRIDE" capability for an account, user, etc. which will have priority and thus override the rules. - will be documented later as developed.

Business rule links to program
In the event user links to a non-existing program, driver program will detect (and handle) a CICS error condition and reject the transaction.
New rules are added using the front end screens in each region (test, QA). After user signoff, the same changes must be repeated in production, during non-trading hours. The expected volume of non-emergency changes is so low that this manual process is seen as the most cost-effective solution.

Revisions

Added Product Type column (all currently "Equity") and a row with Policy Group "ALL" to business Rules result set

Business Rules Trading Pictorial

Business Rules Trading Notes

- Pictorial illustrates a few examples of Flexible Validation Process

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Error and Response Determination Process (including Notify)

Error and Response Determination Process (including Notify) Notes

Possible notifications from this system:

EDGE
- Intrusive alert to broker
- Intrusive alert to EDGE Service Center
- Print Order Drop Copy at the branch
- Print at the Command Center Console in case of system failure

CapMkts
- None of the above
- Under some circumstances, drop copy to London

Notify Process Pictorial

Notify Process Notes

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Log and Assign Ref Process Pictorial

Log and Assign Reference Process Notes

- Allows for Audit Trail

- Allows for various Reports

- Allows for OLT built test simulator to measure Performance, Stress Testing, as well as parallel testing/comparison

- This log key works in a Sysplex environment.

- Entries into a Log Data Stores will be done at all Entry points between PL and OLT Trading Component, as well as at all the Asynchronous Points (ex. write to MQ)

Confirm/Submit Process Pictorial

Confirm/Submit Process Notes

Confirm Process performs the following:
- Maintains a State of a WEB application by checking against POD, if request doesn't exist on POD, reject goes back to Presentation Layer
- Maintains Data Integrity by checking against POD, if request has been modified - difference between stored in POD and received from Presentation Layer

Intraday Credit and Position Load/Check Process Pictorial

Intraday Credit and Position Load/Check Process Notes

This implements a business rule only applicable for Retail/EDGE clients.
Other processing presentation layers, not yet tied into OTP will not use this.
For example CapMkts trading systems won't check this.
While the Intraday DB2 data store is unavailable, EDGE customers will be unable to trade, since their balances cannot be checked.
This requirement is another reason that the OTP process must be synchronous, not async.

Assign Order Reference # Process Pictorial

Assign Order Reference # Process Notes

Recovery Background Process Pictorial

Recovery Background Process Notes

Runs in background(CICS), every # of minutes/seconds (from VC business rules)
Not in processing path
Before being written to MQ, this process puts outgoing message on recovery log for replay.

PLT Time Release Processes:
1. Turn MQ Trigger On - 7 am (business days only)
2. Turn MQ Trigger OFF at 3:59 PM (business days only)
3. Reinitialize Running Daily Balance ?? am(business days only)
4. Obtain Settlement Date 7 am (business days only)
5. Start Recovery Process

Question to be reviewed with user by ATuretsky:
-    On DORS, orders > 2 mins are sent to Perodi to determine action.
-    What should OTP do with Edge. There is nobody to notify, since the user cannot be reached.
-    BOE has a similar issue.
-    The solution needs a business decision, followed by a technical implementation.

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Program Ranges

Program List

Program List Notes

Cleanup/POD Process Pictorial

Cleanup/POD Process Notes

Inquiry Function Pictorial

Inquiry Function Notes

Order/Cancel Message Format Attached as Vol2 on MIS-3
:\OLT\PLINPUT\CANCORD.XLS

Order/Cancel Message Format Attached as Vol2 on MIS-3
:\OLT\PLINPUT\CANCORD.XLS